Washington Transportation Framework for GIS Project (WA-Trans)

WA-Trans Partners Meeting

September 8, 2004

Meetings Next Year

- March 9, 2005
- September 21, 2005
- Both Meetings:
  - 9 a.m. – noon
  - 310 Maple Park Ave. SE in Olympia
  - Room 2F22 (Shamen Room)
- Video-conferencing at WSDOT Regional Office
  - Shoreline, Vancouver, Yakima, Wenatchee, Spokane

New Partners

- ◆ Washington Traffic Records Committee

- ◆ Follows recommendation to this committee from a group called National Highway Traffic Safety Administration (NHTSA) regarding the need for a statewide Linear Referencing System.

- ◆ The Traffic Records Committee has many more uses for WA-Trans.

- ◆ Committee includes WSP, WSDOT, DOH, DOL, Assistant to the Court, and others.

* Note - Not official partners, but interested in participation

Create a more accurate statewide system for roadway feature and event location for improved analysis of traffic related events

1. **Develop a statewide transportation data layer (WA-Trans) for use in Geographic Information Systems across the state**

   a. Develop a framework model and technical standards for a central repository and front and back-end data translator applications.

   b. Conduct King/Pierce County pilot to prototype the translator application

   c. Draft data sharing agreements with state and local data providers.

   d. Develop a secure method for users to access the transportation data layer and load into local jurisdiction applications.

2. **Develop a process and software for the continual maintenance of WA-Trans data.**

Create a more accurate statewide system for roadway feature and event location for improved analysis of traffic related events

3. **Utilize WA-Trans to improve the accuracy of locating traffic-related events.**

    a. Equip law enforcement agencies capable of mobile field reporting with an application employing the WA-Trans data layer to improve in-field traffic event location.

    b. Provide WA-Trans to EMS responders with electronic field reporting capability.

4. **Encourage stateside use of WA-Trans data to enhance transportation analysis and safety efforts.**

    a. Utilize WA-Trans data in CAD and pin-mapping systems throughout the state.

    b. Provide WA-Trans to city and county planners and engineers for use in local GIS applications

Funding Sought

♦ Grant money for Washington Traffic Records Committee Initiatives (unknown at this time),

♦ WSDOT funding through state budget process ($500,327),

♦ Federal Earmark process ($770,000/$192,500),

♦ Department of Homeland Security Information Technology and Evaluation Program ($469,984/$158,116 match)

Funding Received or Approved

- Funding approved for 1 FTE Assistant Project Manager for WA-Trans.
  - Funded through WSDOT Geographic Services with support from the Transportation Data Office.
  - Hope to hire in October.
  - Position funded through June 2005, unless other funding is secured.
  - Position will work on a variety of things including Return on Investment and cost benefit analysis.

Funding Received or Approved

- ♦ Microsoft Grant for $29,000.
  - ♦ Limits what this money can be used for.
  - ♦ Money spent through Microsoft Partner Bfirst Solutions, Inc.
  - ♦ Bfirst will develop detailed requirements for the WA-Trans Translator software.
  - ♦ They will also provide the project with a template for software requirements.
  - ♦ A statement of work is being negotiated and work begins in October.

♦ NSDI Cooperative Agreement Program (CAP) Grant for Participation in The National Map

   ◆ Federal Amount - $75,000

   ◆ WSDOT Amount – $46,208 (in kind, data, data expertise)

   ◆ Puget Sound Regional Council – $22,500

   ◆ Pierce County – $4392 (in kind)

                   $5625 (data and data expertise)

   ◆ King County - $5625 (data and data expertise)

Funding Received or Approved
CAP Grant

♦ Scope –

 ◆ Develop a prototype of WA-Trans Translator. Test with Pierce and King County Data

 ◆ Integrate this data into seamless data set and store in WA-Trans database

 ◆ Test translator for downloading from WA-Trans database

 ◆ Host the integrated data set on The National Map server at Menlo Park, CA as part of the Seattle Tacoma National Map Service

 ◆ Consider options for maintaining the data using the translator.

Funding Received or Approved
CAP Grant

WA-Trans
Partnerships Across the State

Participation	Role	Commitment
WSDOT	Project Management of translator development and integration, Grant Administration, Database Administration, implement and host WA-Trans pilot database.	1,200 hours, WSDOT data (state highways, railroads, ferries) where needed, implement test database, establish IT environment, host WA-Trans data.
PSRC	Integrate Data, Translator Requirements, Translator Testing, Test Integrated Data	280 hours
Pierce County	Provide Pierce County Data Expertise, Integrate Data, Translator Requirements, Test Translator, Test Integrated Data	72 hours plus Pierce County data
King County Metro	Provide King County Data Expertise	King County Data
USGS	Host Integrated Data in The National Map as part of Seattle Tacoma National Map Service	Host TNM data

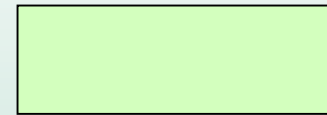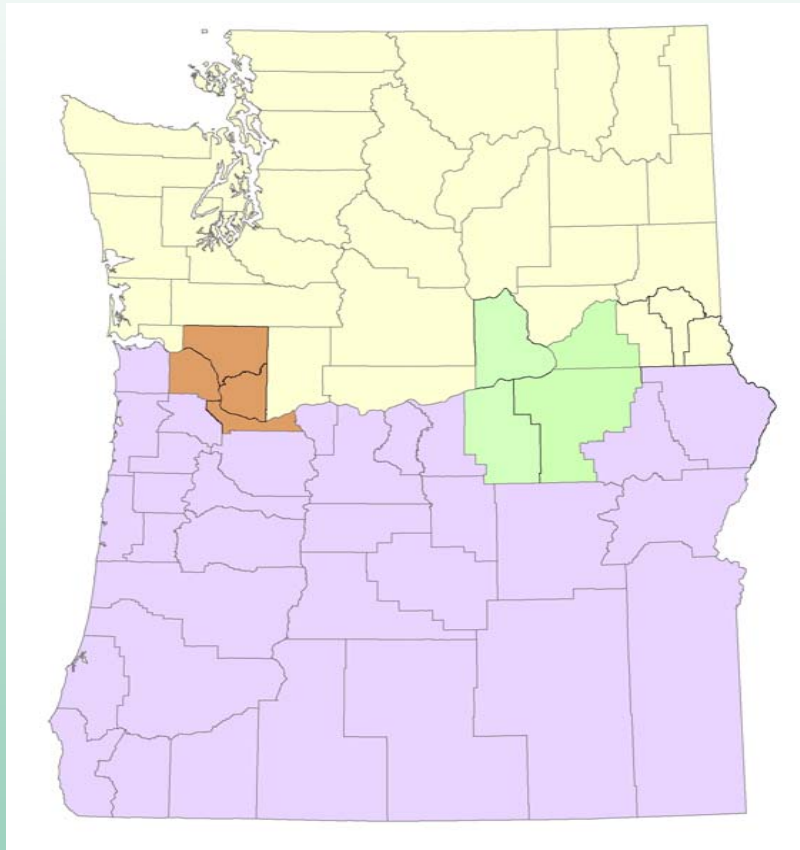# Funding Received or Approved
CAP Grant

Funding Received
OR/WA Pooled Fund Pilot Proposal

- ◆ $240,000 sought for Phase I

- ◆ WSDOT has committed $30,000 research money.

- ◆ ODOT has committed $30,000.

- ◆ Project will be posted with the National Transportation Pooled Fund Website to seek additional partners. Idaho and California have been directly approached.

- ◆ Phase II has not been estimated.

Funding Received
OR/WA Pooled Fund Pilot Proposal

Phase I
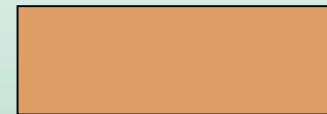
Phase II

Funding Received
OR/WA Pooled Fund Pilot Proposal

- ◆ Research Based

- ◆ Focused on software development
    - ◆ Maintenance,
    - ◆ Development of a "universal translator",
    - ◆ Software solutions for integration and update,
    - ◆ Software solutions for QA/QC,
    - ◆ Software solutions for upload and download,
    - ◆ Synchronization of multi-state databases.

Data Model (History)

- ◆ After reviewing three data models available WA-Trans Steering Committee selected the Oregon All-Roads data model.

- ◆ We have partnered with Oregon and several representatives from various transportation modes (rail, transit, ferry, aviation, non-motorized transportation)

- ◆ The model is complete from Oregon's point of view. Now WA-Trans has a group dedicated to completing the data model.

Data Model (Conceptual View)
Segment Point Model

Segments – represent roads, ferry routes and staging area, heavy rails, bike routes, bus only routes, HOV, light rail, monorail, pedestrian path, aviation runway.

Points – Connection between segments, at intersections between modes and within a mode, changes in ownership. Additionally can represent multi-modal transfer points, and terminals such as ferry or aviation terminals.

Events – Various core attribution is identified. Some of this will be part of the core data structure, but much of it will be event based to minimize need for segmentation of routes.

Data Model (Conceptual View)

Proposed Mode Codes:

- A – automobile, general traffic
- B – bus only (ramps, etc)
- C – bicycle lanes on roadway or separate path
- F – ferry (auto)
- H – high occupancy vehicle (bus or carpool)
- L – light rail

- M – monorail
- P – passenger only ferry
- R – heavy rail
- S – sidewalk or pedestrian only path
- V – aviation (runway, terminal)

WA-Trans

Partnerships Across the State

Data Model (Conceptual View)
Multi-modal View
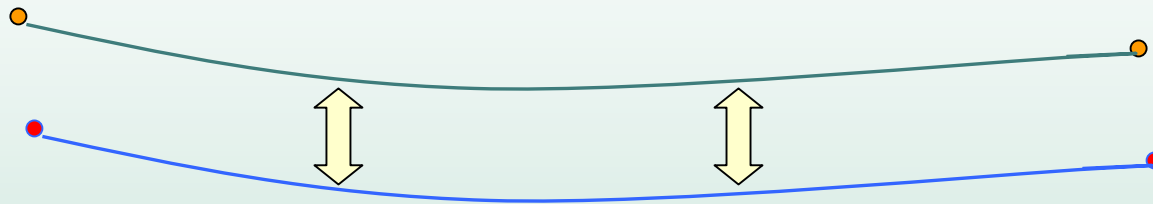
Multiple modes along one path are still under discussion. Alternatives include "stacking representations" and using the mode code on one representation to illustrate various modes along one pathway.

Business Rules for Data
Categories

♦ Segmentation Rules – When do we need a node (point) instead of a vertices (segment).

♦ Attribute Standardization – Rules for addressing, street naming, etc…

♦ Update/Edit Tracking – Rules for event table updates and segment ID evolution.

♦ Spatial Accuracy – Rules regarding scale, edit tolerances and edge-matching.

Business Rules for Data
Draft List

- "At grade" feature intersections will always result in segmentation of intersecting features, regardless of mode.

- Roads will be segmented at the beginning and end of bridges, tunnels.

- Segments may be broken at jurisdiction boundaries.

- Segments may be broken at non-road intersections

- A split of an existing segment will result in retirement of the original Segment ID and assignment of two new Segment IDs.

- Any segment or segment point geometry edits, joins, or splits force an update of all associated events tables.

Business Rules for Data
Draft List - Continued

♦ Segment Point IDs will not change (facilitating their use as multi-modal transfer stations).

♦ Multi-modal segments will be accommodated with multiple features having coincident geography ("stacked arcs").

♦ What "triggers" an address change/edit?

♦ Process for dealing with duplicate line work?

♦ Address element standardization?

♦ How do we deal with blank name or unnamed roads?

Business Rules for Data
Draft List - Continued

♦ Linear features must match at jurisdictional boundaries.

♦ Time/Date stamping shall be used to ensure proper records management and adequate metadata.

♦ FGDC compliant metadata shall be maintained for all address datasets.

♦ Each jurisdiction shall document inconsistencies in their master street name database and in their master address database.

Standards

- Working on collecting core attribution.
- Draft core attribution developed for:
  - Aviation, Rail, Road, Non-motorized, and Ferries
- No decision has been made regarding which fields are required and which are optional.
- Metadata will be based on the ISB standard.
- No decisions have been made regarding which metadata will be optional, required or excluded from that standard.

Standards
Draft Roads Core Attribution

◆ CORE	LENGTH	Number	16	Calculated length in US Survey Foot
◆ CORE	OWNER	String	?	Entity responsible for maintenance of segment
◆ ROADSONLY	RDNAME	String	72	Concatenated segment name
◆ ROADSONLY	DIR	String	2	Prefix direction (N,S,E,W,etc.)
◆ ROADSONLY	NAME	String	64	Road name
◆ ROADSONLY	TYPE	String	3	Type (St, Ave, Ct, etc.)
◆ ROADSONLY	SUFF	String	2	Suffix component
◆ ROADSONLY	ALIASLIST	String	200+?	Alias list separated by ';' Keywords & AKA's
◆ ROADSONLY	FROMLEFT	Number	10	Left low address range
◆ ROADSONLY	TOLEFT	Number	10	Left high address range

Standards
Draft Roads Core Attribution

◆ ROADSONLY	FROMRIGHT	Number	10	Right low address range
◆ ROADSONLY	TORIGHT	Number	10	Right high address range
◆ ROADSONLY	ZONELEFT	String	16??	Area descriptor, left side (could be ZIP)
◆ ROADSONLY	ZONERIGHT	String	16??	Area descriptor, right side (could be ZIP)
◆ ROADSONLY	FROMMILEPOST			
◆		Number	6	Beginning Milepost
◆ ROADSONLY	TOMILEPOST			
◆		Number	6	Ending Milepost
◆ CORE	LCITY	String	32	City on left side of segment
◆ CORE	RCITY	String	32	City on right side of segment
◆ CORE	COUNTY	Number	2	County code for segment

Standards
Draft Roads Core Attribution

♦ ROADSONLY	FUNCTIONCLASS	Number	2	Function Class assigned by RDOWNER
♦ ROADSONLY	PAVEMENTTYPE	String	1	Pavement Type assigned by RDOWNER
♦ CORE	S_DATE_MOD	Date	8	Date of last modification to geometry
♦ CORE	SUBMITTOR	String	?	Entity submitting data
♦ CORE	MODE_FLAG	String	10	Road, Ferry, Rail, Airport, etc.
♦ CORE	FACILITY_NAME	String	100	Name of Facility
♦ CORE	UNIQUE_ID			
♦ CORE	LOCAL_ID			
♦ ROADSONLY	LANES			
♦ ROADSONLY	SPEED_LIMIT			
♦ CORE	JURISDICTION			
♦ ROADSONLY	BIKE_LANE			

Standards
Draft Railroads Core Attribution

Railroad Name	Alphanumeric	75	The Name the "line" or railroad company
Operator	Alphanumeric	75	Could be the owner, but may not be
Line Identifier	Alphanumeric	6	SEATAC where the first 3 letters is the originator and the last the destination
USDOT Number	Alphanumeric	7	A code for all railroad crossings
Crossing Code	Alphanumeric	1	Type of crossing – over, under, at grade, pedestrian
From Mile Post	Float	6.2	Lower mileage value of segment beginning
To Mile Post	Float	6.2	Higher mileage value of segment end
Public	Boolean (Y/N)	1	Railroad feature part of public railroad line?
Track Class	Numeric	1	Federal designator that indicates various things such as maximum speed allowed. Can be values 0 – 6

WA-Trans

Passenger Train	Boolean (Y/N)	1	Identifies if a regularly scheduled passenger train uses the line.
Number of Tracks	Numeric	2	Applies both to rail lines and crossings.
Type of segment	Alphanumeric	1	Possible values include: siding, mainline, industrial spur
Warning Device	Numeric	2	Code identifying whether there is sign, or lights or other types of devices. From the Federal Railway Administration Data.
Train Station	Boolean (Y/N)	1	Applies to a node. Indicates there is a train station.
Train Station Name	Alphanumeric	15	The name of the train station. Applies to a node.

WA-Trans

Standards
Draft Ferries Core Attribution

Route Name   Alphanumeric 50   Full route name usually includes the cities traveled to or beginning and end cities.

Route Length   Numeric   3   Can be either nautical or statue miles.

Domestic   Boolean (Y/N) 1   Is the route international or domestic.
                                        Yes = domestic.

Route Abbreviation Alphanumeric 10   Abbreviation of the route name.

Average Sailing Duration

                    Numeric   4   This is the average duration of sail for a particular route.

Terminal Name   This could be an end node for the ferry route, and will likely have a different mode from the ferry route mode.

Standards
Draft Ferries Core Attribution Continued

Address1	Alphanumeric	50	Terminal street address
Address2	Alphanumeric	50	Terminal street address
City	Alphanumeric	15	City the terminal is in
Zip	Alphanumeric	9	Terminal zip code
County	Alphanumeric	15	County the terminal is in
Holding space	Numeric	9	This is a terminal by terminal based on average vehicle length
Operator	Alphanumeric	50	Name of the operator of the route. There are several private and county owned routes.

Standards
Draft Aviation Core Attribution

Airport Identifier	Alphanumeric	4	In the US begins with 'K'
Runway Identifier	Alphanumeric		Applied to differentiate runways on multiple runway facilities
Defense Dept Agreement			
	Alphanumeric	1	R=Army, A=Air Force, N=Navy
International Airport	Boolean (Y/N)	1	Airports identified as international have customs
Surface Type	Alphanumeric	3	Pavement Conditions Index (PCI) Code
Approach	Alphanumeric	1	Visual, Precision, Non-Precision
Airport Reference Code (ARC)			
	Alphanumeric	4	Size, weight, speed & length of wings from tip to tip (can be used to determine maximum size of aviation vehicle that can land and take off .

Standards
Draft Aviation Core Attribution Continued

Runway length	Numeric	5	Expressed as feet
Runway Width	Numeric	4	Expressed as feet
Use	Alphanumeric	8	Includes: apron (parking for planes) taxiway, runway
Elevation	Numeric	6.1	Expressed as feet
FAA Classification	Alphanumeric	20	From the NPIAS – National Plan of Integrated Airport Systems Commercial, Primary, Reliever and General Aviation
State Classification	Alphanumeric	10	Washington specific
Airport Name	Alphanumeric	100	Official name
Tower	Boolean (Y/N)	1	Is there a tower at the airport?

Standards
Draft Aviation Core Attribution Continued

Weather-reporting capabilities	Boolean (Y/N)	1
		Automated Weather Observation System (AWOS) or Automated Surface Observation System (ASOS)
Owner	Alphanumeric	30

Standards
Draft Non-motorized Core Attribution

Width	Number	16	Calculated width in US Survey foot
Surface type	Alpha	1	Type of surface, assigned by owner
Owner	String	?	Entity responsible for maintenance of segment

Architecture

◆ Translator – High level requirements:

- ◆ Translate into WA-Trans format from standard GIS formats
- ◆ Translate out of WA-Trans format to standard GIS formats
- ◆ Wizard to aid in initial translation
- ◆ Use to facilitate exchange of transportation related information without WA-Trans
- ◆ Prototype during King/Pierce County pilot
- ◆ Complete during WA/OR pilot
- ◆ First level QA/QC

Architecture

♦ Data Provider Interface – High level requirements:
- Provide reporting on data not used by WA-Trans
- Provide feedback mechanism for data issues from users
- Develop during OR/WA pilot Phase 1.

♦ Data User Interface –
- Clip by county boundaries
- Clip by X,Y min/max
- Clip by prearranged boundaries
- Statewide
- Allow user to provide input on data issues
- Develop during OR/WA pilot Phase 1.

Architecture

- Integration Software – High Level Requirements
  - Partly manual, partly automated.
  - Will likely be developed for edge matching integration first.
  - Will be developed over time as we become greater experts in the data.
  - Requirements will be done on this during OR/WA Phase I pilot.
- QA/QC Software – High Level Requirements
  - Partly manual, partly automated
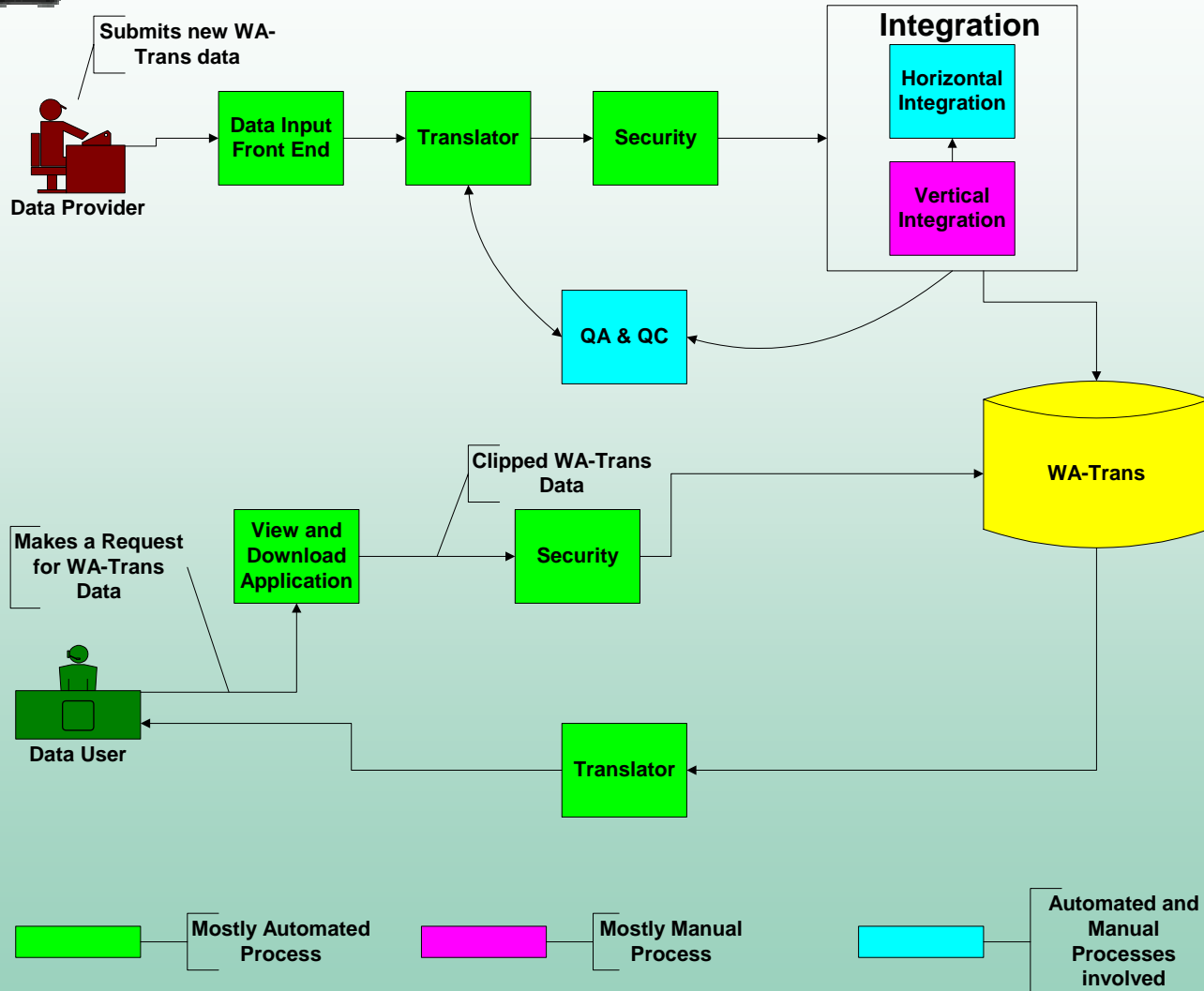 - Will be developed as procedures become refined and consistent

Architecture

♦ Security Software - High Level Requirements

- ◆ Will initially provide functions for data providers,
- ◆ After we have developed with publicly available data, we will investigate security for non-public data.
- ◆ May require some creative handling for non-public data due to public disclosure laws.

Conceptual Architecture

Submits new WA-Trans data

Data Provider

Data Input Front End

Translator

Security

Integration

Horizontal Integration

Vertical Integration

QA & QC

WA-Trans

Clipped WA-Trans Data

Makes a Request for WA-Trans Data

View and Download Application

Security

Data User

Translator

Mostly Automated Process

Mostly Manual Process

Automated and Manual Processes involved

Processes and Policies

- ◆ Processes for establishing agreement points,
- ◆ Feedback to data providers, process for correction,
- ◆ Strategies for resolving more than one source of data,
- ◆ Strategies for dealing with no data,
- ◆ Process for reconciling segment schemes,
- ◆ Cross walk between various road/transportation classification systems,
- ◆ QA/QC process e.g. features meeting correctly,

Processes and Policies

- Process for dealing with scale and accuracy,
- Public data policy,
- Private data for particular business needs,
- Contact through which data should be authorized (County Engineers?) ,
- Stewardship related processes,
- Versioning and access to earlier versions,
- Update cycles,

Processes and Policies

♦ Notification of updates,

♦ Inventory of gaps in data (including attribution) for prioritization of data acquisition.

♦ And others as well.

♦ Pilots will solidify a lot of this.

Next Steps

- Complete Requirements for Translator,

- Complete Database Design,

- Complete Standards,

- Develop Detailed Pilot Charter and Project Plan,

- Implement Pilot,

- Continue to Seek Funding.

Write Letters of Support!!!

♦ Write "To Whom It May Concern",

♦ Generic, explain why your organization is participating,

♦ Use letterhead

♦ Tami Griffin

Washington State Department of Transportation

Geographic Services

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